

Contents

Subject Index	V	Grove, T.L., s. Gerlach, D.C.	147
List of Locations	VIII	Grover, J., s. Davidson, P.M., et al.	88
Abraham, K., s. Schreyer, W., et al.	103	Gruau, G., s. Jahn, B., et al.	25
Aguirre, L., s. Levi, B., et al.	49	Hallberg, J.A., s. Giles, C.W.	307
Akai, J.: Polymerization Process of Biopyrobole in Metasomatism at the Akatani Ore Deposit, Japan	117	Henderson, P., s. Lowry, R.K., et al.	254
Akasaka, M., s. Onuki, H., et al.	183	Henjes-Kunst, F., Kreuzer, H.: Isotopic Dating of Pre-Alpidic Rocks from the Island of Ios (Cyclades, Greece)	245
Baker, M.B., s. Herzberg, C.T., et al.	319	Herzberg, C.T., Baker, M.B., Wendlandt, R.F.: Olivine Flotation and Settling Experiments on the Join Mg_2SiO_4 - Fe_2SiO_4	319
Beams, S.D., s. Collins, W.J., et al.	189	Hiroi, Y., s. Kitamura, M.	110
Berkley, J.L., s. Ripley, E.M., et al.	230	Holm, P.M., Lou, S., Nielsen, A.: The Geochemistry and Petrogenesis of the Lavas of the Vulsinian District, Roman Province, Central Italy	367
Brown, E.H., O'Neil, J.R.: Oxygen Isotope Geothermometry and Stability of Lawsonite and Pumpellyite in the Shuksan Suite, North Cascades, Washington	240	Houtte, P. van, s. Wagner, F., et al.	132
Carmichael, I.S.E., s. Luhr, J.F.	262	Hunziker, J.C., s. Desmons, J., et al.	386
Carmichael, I.S.E., s. Stebbins, J.F., et al.	276	Ibarguchi, I.G., Martinez, F.J.: Petrology of Garnet-Cordierite-Sillimanite Gneisses from the El Tormes Thermal Dome, Iberian Hercynian Foldbelt (W Spain)	14
Chappell, B.W., s. Collins, W.J., et al.	189	Jahn, B., Gruau, G., Glikson, A.Y.: Komatiites of the Onverwacht Group, S. Africa: REE Geochemistry, Sm/Nd Age and Mantle Evolution	25
Chopin, C., Maluski, H.: Unconvincing Evidence Against the Blocking Temperature Concept? A Reply	391	Kern, H., s. Wagner, F., et al.	132
Collins, W.J., Beams, S.D., White, A.J.R., Chappell, B.W.: Nature and Origin of A-Type Granites with Particular Reference to Southeastern Australia	189	Kitamura, M., Hiroi, Y.: Indialite from Unazuki Pelitic Schist, Japan, and Its Transition Texture to Cordierite	110
Crowe, B.M., s. Vaniman, D.T., et al.	341	Köhler-Herbertz, B., s. Flörke, O.W., et al.	324
Davidson, P.M., Grover, J., Lindsley, D.H.: (Ca, Mg) $_2$ Si $_2$ O $_5$ Clinopyroxenes: A Solution Model Based on Nonconvergent Site-Disorder	88	Kreuzer, H., s. Henjes-Kunst, F.	245
Delaloye, M., s. Desmons, J., et al.	386	Langer, K., s. Flörke, O.W., et al.	324
Desmons, J., Hunziker, J.C., Delaloye, M.: Unconvincing Evidence Against the Blocking Temperature Concept. Comments on: " ^{40}Ar - ^{39}Ar Dating of High Pressure Metamorphic Micas from the Gran Paradiso Area (Western Alps): Evidence Against the Blocking Temperature Concept" by C. Chopin and H. Maluski	41	Levi, B., Aguirre, L., Nyström, J.O.: Metamorphic Gradients in Burial Metamorphosed Vesicular Lavas: Comparison of Basalt and Spilitite in Cretaceous Basic Flows from Central Chile	49
Dostal, J., s. Dupuy, C., et al.	41	Lindsley, D.H., s. Davidson, P.M., et al.	88
Dupuy, C., Dostal, J., Fratta, M.: Geochemistry of the Adamello Massif (Northern Italy)	41	Lou, S., s. Holm, P.M., et al.	367
ElGoresy, A., s. Medenbach, O.	358	Lowry, R.K., Henderson, P., Nolan, J.: Tracer Diffusion of Some Alkali, Alkaline-Earth and Transition Element Ions in a Basaltic and an Andesitic Melt, and the Implications Concerning Melt Structure	254
Esling, C., s. Wagner, F., et al.	132	Luhr, J.F., Carmichael, I.S.E.: The Colima Volcanic Complex, Mexico: III. Ash- and Scoria-Fall Deposits from the Upper Slopes of Volcán Colima	262
Essene, E.J., s. Newberry, N.G., et al.	334	Maluski, H., s. Chopin, C.	391
Ferry, J.M.: A Comparative Geochemical Study of Pelitic Schists and Metamorphosed Carbonate Rocks from South-Central Maine, USA	59	Martinez, F.J., s. Ibarguchi, I.G.	14
Fitz Gerald, J.D., McLaren, A.C.: The Microstructures of Microcline from Some Granitic Rocks and Pegmatites	219	Mattey, D.P.: The Minor and Trace Element Geochemistry of Volcanic Rocks from Truk, Ponape and Kusaie, Eastern Caroline Islands; the Evolution of a Young Hot Spot Trace Across Old Pacific Ocean Crust	1
Flörke, O.W., Köhler-Herbertz, B., Langer, K., Tönges, I.: Water in Microcrystalline Quartz of Volcanic Origin: Agates	324	McLaren, A.C., s. Fitz Gerald, J.D.	219
Franceschelli, M., Memmi, I., Ricci, C.A.: Ca Distribution Between Almandine-Rich Garnet and Plagioclase in Pelitic and Psammitic Schists from the Metamorphic Basement of North-Eastern Sardinia	285	Medenbach, O., ElGoresy, A.: Ulvöspinel in Native Iron-Bearing Assemblages and the Origin of These Assemblages in Basalts from Ovifak, Greenland, and Bühl, Federal Republic of Germany	358
Fratta, M., s. Dupuy, C., et al.	41	Medenbach, O., s. Schreyer, W., et al.	103
Fujii, T., Scarfe, C.M.: Petrology of Ultramafic Nodules from West Kettle River near Kelowna, Southern British Columbia	297	Memmi, I., s. Franceschelli, M., et al.	285
Gebert, W., s. Schreyer, W., et al.	103	Moret, L.K., s. Stebbins, J.F., et al.	276
Geissman, J.W., s. Newberry, N.G., et al.	334	Muecke, G.K., s. Pride, C.	379
Gerlach, D.C., Grove, T.L.: Petrology of Medicine Lake Highland Volcanics: Characterization of Endmembers of Magma Mixing	147	Müller, W.F., s. Schreyer, W., et al.	103
Gerlach, D.C., s. Grove, T.L., et al.	160	Nedachi, M., s. Onuki, H., et al.	183
Giles, C.W., Hallberg, J.A.: The Genesis of the Archaean Wellcome Well Volcanic Complex, Western Australia	307	Newberry, N.G., Peacor, D.R., Essene, E.J., Geissman, J.W.: Silicon in Magnetite: High Resolution Microanalysis of Magnetite-Ilimenite Intergrowths	334
Gladney, E.S., s. Vaniman, D.T., et al.	341	Nielsen, A., s. Holm, P.M., et al.	367
Glikson, A.Y., s. Jahn, B., et al.	25	Nolan, J., s. Lowry, R.K., et al.	254
Grove, T.L., Gerlach, D.C., Sando, T.W.: Origin of Calc-Alkaline Series Lavas at Medicine Lake Volcano by Fractionation, Assimilation and Mixing	160	Nyström, J.O., s. Levi, B., et al.	49
		O'Neil, J.R., s. Brown, E.H.	240
		Onuki, H., Akasaka, M., Yoshida, T., Nedachi, M.: Ti-Rich Hydro-	

andradites from the Sanbagawa Metamorphic Rocks of the Shibukawa Area, Central Japan	183	Tönges, I., s. Flörke, O.W., et al.	324
Peacor, D.R., s. Newberry, N.G., et al.	334	Vaniman, D.T., Crowe, B.M., Gladney, E.S.: Petrology and Geochemistry of Hawaiite Lavas from Crater Flat, Nevada	341
Philpotts, A.R.: Compositions of Immiscible Liquids in Volcanic Rocks	201	Wagner, F., Wenk, H.-R., Kern, H., Houtte, P. van, Esling, C.: Development of Preferred Orientation in Plane Strain Deformed Limestone: Experiment and Theory	132
Plyusina, L.P.: Geothermometry and Geobarometry of Plagioclase-Hornblende Bearing Assemblages	140	Watson, E.B.: Basalt Contamination by Continental Crust: Some Experiments and Models	73
Pride, C., Muecke, G.K.: Geochemistry and Origin of Granitic Rocks, Scourian Complex, NW Scotland	379	Weill, D.F., s. Stebbins, J.F., et al.	276
Rao, B.V., s. Ripley, E.M., et al.	230	Wendlandt, R.F., s. Herzberg, C.T., et al.	319
Ricci, C.A., s. Franceschelli, M., et al.	285	Wenk, H.-R., s. Wagner, F., et al.	132
Ripley, E.M., Rao, B.V., Berkley, J.L.: Mineralogical and Chemical Variations Within Layered Sills of the Deer Lake Complex, Minnesota	230	White, A.J.R., s. Collins, W.J., et al.	189
Sando, T.W., s. Grove, T.L., et al.	160	Yoshida, T., s. Onuki, H., et al.	183
Scarfe, C.M., s. Fujii, T.	297	Correction	296
Schreyer, W., Medenbach, O., Abraham, K., Gebert, W., Müller, W.F.: Kulkite, a New Metamorphic Phyllosilicate Mineral: Ordered 1:1 Chlorite/Talc Mixed-Layer	103	Indexed in Current Contents/ Abstracted in Mineralogical Abstracts	
Stebbins, J.F., Weill, D.F., Carmichael, I.S.E., Moret, L.K.: High Temperature Heat Contents and Heat Capacities of Liquids and Glasses in the System $\text{NaAlSi}_3\text{O}_8\text{--CaAl}_2\text{Si}_2\text{O}_6$	276		

324
341
132
73
276
319
132
189
183

296

100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000

Sul

Actino

activa

adcu

liqui

aegiri

aenigi

agate

-, imp

-, wat

age d

-, me

albite

-, twin

-, -, la

alkali

alkali

-, mic

alkali

alkalin

258

alkalis

-, trac

amphi

-, hav

-, sup

amyg

anate

andal

andes

andes

-, me

-, orig

andra

ankar

anker

anorth

apatite

-, mic

Ar, mi

Arrhe

257

ash fa

assim

-, cal

-, hav

A-type

augite

autob

avala

awaru

Ba, C

bandi

basalt

-, Cre

-, ultr

-, ulv

basalt

basalt

basan

-, Col

biopy

117

biotite

Subject Index

- Actinolite 36, 50, 230, 240
activation energies, diffusion in melts 257
adcumulus textures, olivine and coex. liquids 322
aegirine 3
aenigmatite 3
agates 324f.
-, impurities 329
-, water contents 328
age dating, Colima soil horizons 264
-, metamorphic micas 386f.
albite 36, 50, 103, 240
-, twinning 221
-, -, lamellae 222
alkali basalt 6
alkali feldspar 215
-, microstructures 219f.
alkali feldspar/basalt interaction 77f.
alkaline earths, diffusion in silicate melts 258f.
alkalis, diffusion in silicate melts 258f.
-, tracers in melts 255
amphibole 60, 119, 387
-, hawaiites 347
-, superstructures 123
amygdules, Cretaceous lavas 49f.
anatexis, granite petrogenesis 384
andalusite 60
andesine 37
andesite 147f., 203, 270, 307f., 369
-, melt diffusion 255f.
-, origin 160f.
andradites, Ti-rich 183f.
ankaramite 6
ankerite 62
anorthoclase 3
apatite 17
-, microphenocrysts 3
Ar, mica dating problems 388f.
Arrhenius diagrams, diffusion in silicate melts 257, 260
ash fall sequence, Colima 263f.
assimilation, basaltic magmas 86
-, calc-alkaline series 160ff.
-, hawaiites 350
A-type granite 189, 194f.
augite 151, 201, 233, 268f.
autobrecciation, lava flows 309
avalanche deposits, Colima 263f.
awaruite 183

Ba, Colima scoriae 267
banding, ultramafic nodules 299
basalt 3f., 147, 152, 204, 341f.
-, Cretaceous, Chile 49f.
-, ultramafic nodules 297f.
-, ulvöspinel/native iron assemblage 358f.
basalt contamination 73f.
basaltic komatiite 36
basanite 6, 368
-, Colima 266f.
biopyroxenes, metasomatic polymerization 117f.
biotite 15, 41, 60, 247, 287

blocking temperature concept, metamorphic micas, $^{40}\text{Ar}/^{39}\text{Ar}$ dating 386f., 391f.
blueschists 240
breccia, lava flow 309
bronzite 270
burial metamorphism, basalts 49f.
-, chemical changes 53f.
bytownite, hawaiites 349

Calc-alkaline basalt 266f.
calc-alkaline series, assimilation 169
-, crystallization 169
-, low-pressure phase relations 169
-, mixing paths 169
calc-alkaline volcanics, Archaean 307f.
calcite 50
-, glide systems, critical shear stresses 137
caldera, Colima 293
-, Medicine Lake 147
calorimetry, measurements of enthalpy and heat capacity in silicate liquids 276f.
cation exchange, metamorphic pelitic schists 70
chalcedony, agates 324f.
charcoal, Colima 264
chemical analysis
-, andesites, Archaean, W. Australia 312
-, -, Mt. Hood 61
-, basalts, Archaean, W. Australia 312
-, -, Brit. Columbia 299
-, -, minerals 300
-, -, Chile 51
-, biopyroxenes, Japan 120
-, biotite, Iberian gneiss 19
-, chromites, layered sills 235
-, clinopyroxenite, Ti-bearing 184
-, cordierites 111
-, -, Iberian gneiss 18
-, dacite, Archaean, W. Australia 312
-, gabbros, Ti-bearing 184
-, garnet, coex. with plagioclase pelitic schists 67
-, -, Iberian gneiss 17
-, -, Sardinian gneiss 289
-, glasses, volcanic rocks 207, 213
-, gneiss, Iberian massif 17
-, granites, Scourie 381
-, granitic suites, Australia 191f.
-, granitoids, Adamello 44
-, hawaiites, Crater Flat 344
-, hornblende, Colima volcanics 272
-, ilmenites, Bühl and Ovifak 361
-, lavas, Caroline Islds. 4
-, -, Medicine Lake 151
-, -, -, olivine 148
-, -, -, plagioclase 148
-, -, -, pyroxene 148
-, -, Vulsinian district 369
-, layered mafic sills 236
-, lherzolite minerals 301
-, magnetite/ilmenite intergrowths 336
-, olivines, layered sills 234
-, -, ulvöspinel-bearing xenoliths 365
-, olivine websterite minerals 301

-, pelitic schists, Maine 61, 64
-, phlogopite, Colima volcanics 272
-, plagioclase, coex. with garnet, pelitic schists 67
-, -, Sardinian gneisses 292
-, pyroxenes, Colima volcanics 271
-, -, layered sills 235
-, rhyolite, Archaean, W. Australia 312
-, scoriae, Colima 266
-, spilite, Chile 51
-, spinel, Colima volcanics 272
-, -, spinel lherzolite 302
-, ulvöspinel, Bühl and Ovifak 361
-, volcanic rocks, India 34
-, -, Onverwacht group, S. Africa 26
-, wehrlite minerals 301
chemical mixing, clinopyroxenes, equations 97
chemical zoning, Iberian gneiss minerals 18f.
chert 324
chessboard microstructures, microclines 228
chilled margins, layered sills 230f.
chlorite 36, 230, 240, 286, 310
chromite 234, 268
cinder cones 368
clinocllore 105f.
clinojthompsonite 117f.
clinopyroxene 3f., 33, 119, 230, 235, 300, 310, 347, 368
-, solid solutions 89f.
clinopyroxenite 184, 298
-, layered sills 232
clinozoisite 36
cohenite 359
contamination models, basalts 83f.
continental crust, basalt contamination 73f.
cordierite 15f., 110f.
-, polymorphs 110f.
cotection, Medicine Lake lavas 169
Cr, Colima volcanics 267
crossite 240
crustal contamination 41f.
crystal fractionation, hawaiites 349
crystallite size, agates 328

Dacite 151, 312
dating, metamorphic micas 386f.
deformation, experim. in limestones 132f.
deformation textures, limestones 134f.
dehydration behaviour, agates 328
densities, agates 328, 330
density, olivine and coex. liquid 320
differentiation, Caroline Isl. lavas 6f.
-, I-type magmas 197
-, layered mafic sills 230f.
-, magmatic systems 319f.
-, tholeiitic magmas 215
differentiation model, andesite formation 315
diffusion, experimental, feldspar/basalt and granite/basalt 75
-, melts 254f.
-, metamorphism 65f.

- , —, micas, $^{40}\text{Ar}/^{39}\text{Ar}$ dating 386
- , zoned magma chambers 82
- diffusivity calculation, basalt contamination 80f.
- diopside 60, 246, 374
- , Ca dissolution 88f.
- diorite 41
- disequilibrium features, Caroline Isld. lavas 7
- disequilibrium melting, granite petrogenesis 384
- disorder, amphiboles 123
- , diopside 88f.
- dissolution, quartz 74
- dolomite 103f.
- domains, microclines 222, 227
- , Si in magnetite 337
- drop calorimetry, heat capacity in silicate liquids 276f.
- DSC, heat content measurements in silicate liquids 276f.
- Element migration, metamorphism 59f., 65
- enthalpy of mixing, glasses 282
- enthalpy of solution, clinopyroxenes 94
- epidote 36, 50, 241, 287, 310
- equilibrium, clinopyroxene solid solution 90f.
- equilibrium pressure estimation, ultramafic nodules 304
- Eu anomaly, Scourian granites 382
- evaporites 103f.
- exsolution, perthites 380
- exsolution lamellae, ulvöspinel 358
- exsolution microstructures, microclines 220
- Fe, structural role in silicate melts 296
- ferroaugite 230f.
- fibrous quartz 325
- flint 324
- flotation, olivine on melt 319
- fractional crystallization, komatiite petrogenesis 33f.
- , Vulsinian lavas 372f.
- fractionation, calc-alkaline series 160ff.
- , hawaiites 349f.
- fractionation models, Medicine Lake volcanics 172f.
- fractionation trends, Caroline Isld. lavas 7
- Gabbro 41
- , layered sills 232f.
- garnet 15f., 246, 285f.
- garnet fractionation, komatiite petrogenesis 32f.
- garnet-plagioclase pairs, metamorphic Ca distribution 285f.
- geochronology, Archaean Onverwacht group 28f.
- , metamorphic rocks, Cyclades 245f.
- geothermal gradient, upper mantle 304
- geothermobarometry, plagioclase/hornblende 140ff.
- geothermometry, Briançonnais 388f.
- , coex. plagioclase/hornblende pairs 140f.
- , O isotopes, metamorphic rocks 240f.
- , ultramafic nodules 303
- Gibbs free energies, subsolidus reactions, Fe-Ti oxides 360
- glass 360
- , heat capacity measurements 278
- , immiscible in volcanics 201f.
- globules, immiscible in volcanics 201ff.
- globulitic structures, volcanics 201f.
- glaucofane 240
- gneiss 14f., 245, 286, 380
- graben, Colima 262
- granite 15, 189ff.
- , microstructures in microclines 219f.
- , origin by gneiss anatexis 379f.
- , petrogenesis, Scourie 384ff.
- , sheets 380f.
- granitic suites 189ff.
- granodiorite 41f.
- granulites 380f.
- graphite 359
- greenschists 240
- greenstone belt 25
- Haplogranite system 380
- harzburgite 304
- hawaiite 31f., 341f.
- , definition 346
- heat capacity, silicate liquids 281f.
- hedenbergite 201f.
- hematite 50
- hexagonal cordierite 110f.
- high temperature enthalpy, silicate liquids 276f.
- hornblende 36, 41f., 232, 246, 271
- , coex. with plagioclase 143
- hot spot trace, Caroline Islds. 1ff.
- hydroandradite 183f.
- , Mössbauer data 185
- , physical properties 187
- hydrogrossular 183f.
- hypersthene 204
- Ignimbrite 49, 368
- ilmenite 36, 234, 359
- , intergrowths with magnetite 334f.
- immiscible liquids, volcanics 201ff.
- incompatible elements, Colima volcanics 268
- indialite 110f.
- , phase relations 115
- intercumulus minerals, layered mafic sills 232f.
- interdiffusion, granite/basalt 75
- intergrowths, magnetite/ilmenite 334f.
- , native iron and cohenite 359
- intra-plate volcanism, Pacific 11
- intratelluric theory, native iron in basalts 364
- iron, native in basalt 358f.
- , —, theory of formation 363f.
- isochemical metamorphism 59f.
- isograds, metamorphic pelitic schists 60
- Jasper 324
- jimthompsonite 117
- Kaersutite 5
- keratophyre 49
- K-feldspar 15, 41, 50, 189
- , microstructures 220f.
- K_2O , Colima volcanics 267
- komatiites 25ff.
- , metamorphic minerals 36
- , petrogenetic models 33
- , rare earth distribution pattern 30
- kukeite 103f.
- , formula 105
- , X-ray data 104
- Lagoons, Caroline Islds. 1f.
- lamellae, microcline twinning 222f.
- laumontite 50
- lavas, Caroline Islds. 1f.
- , Chile 49f.
- , immiscible liquids 201f.
- , Vulsinian district 368f.
- , —, fractionation model 374
- lava flows, Archaean 307f.
- , Crater Flat 343f.
- , ultramafic nodules 297f.
- lava series, Caroline Islds. 3f.
- lawsonite 387
- , stability 240f.
- layered sills 230f.
- leucite 368
- leucite tephrite 368
- leucitite 368f.
- lherzolite 298
- , mineral chemistry 301
- limestones, experim. deformation 132f.
- liquid densities, magma mixing 179
- liquid fractionation, basalts 210f.
- liquids, immiscible in volcanics 201f.
- Maar 262
- magma, element diffusivity 254f.
- magma chamber, diffusion 82
- magma chamber processes, Medicine Lake volcano 170
- magma segregation, Archaean volcanics 315
- magma mixing 153ff.
- , textural evidence 155f.
- magma mixing model, Colima volcanics 273
- magnetite 4, 201f., 231, 349
- , Si content 334f.
- magnetite/ilmenite intergrowths 334f.
- magnetite morphology, basalts exhibiting immiscibility 206f.
- mantle evolution 32f.
- mantle metasomatism 355
- mantle minerals, K, Rb and Sr 355
- mantle nodules 298f.
- Margules parameter, pyroxene solid solutions 89f.
- melanite 183f.
- melt, diffusion experiments 76
- melting anomaly, Caroline Islds. 1f.
- melt structure 254f.
- mesocumulate texture, olivine and coex. liquid 322
- mesoperthite 380
- mesostasis, volcanics 201f.
- metacarbonates 65f.
- metallic Fe, basalts 358
- metamorphic differentiation, granite petrogenesis 384
- metamorphic grade, indicators 285

metamorphic gradients, Chilean metabasalts 54f.

metamorphic zones, spilitic rocks 51f.

metamorphism, Briançonnais 388, 392

-, Iberian massif 15f.

-, los 245f.

-, pelitic schists 59ff.

-, Sardinia 285f.

metapelites, Ca distribution between coex. garnets and plagioclases 285f.

metasomatism, pyroxene polymerization 117f.

-, upper mantle 355

micas, age determinations 245f.

-, $^{40}\text{Ar}/^{39}\text{Ar}$ dating 386f., 392

microcline 247

-, microstructures 219f.

microcrystalline quartz 324f.

microstructure, agates 330

minette 268

mixed layer, kulkite 103ff.

mugearite 31., 205

muscovite 63, 247, 287

Nepheline 4, 368

nepheline basalt 3f.

nepheline hawaiite 346

nodules, agates 326f.

-, ultramafic 298f.

-, -, banding 299

-, -, pyroxene composition 302

novaculite 324

O isotope relations, metamorphic rocks 240f.

oligoclase 36

olivine 3f., 148, 214, 230, 234, 270, 299f.,

347f., 360, 368

olivine andesite 151f.

olivine basalt 204

olivine clinopyroxenite 298

olivine flotation, melt 319

olivine settling, melt 319

olivine tholeiite 201, 204

olivine websterite, mineral chemistry 301

opal 325

opal-CT 327

ordering, pyroxenes 89f.

orientation, deformed limestone 132f.

orthoclase 219

orthopyroxene 33, 151, 269, 300

Pahoe-hoe, immiscibility 201f.

partial melting, andesite formation model 314

-, granite petrogenesis 197, 384

-, hawaiite origin 354

-, komatiite origin 25f.

pearlite 359

pegmatites 383

-, microcline microstructures 219f.

pelitic schists, metamorphism 59f.

pentlandite 360

periclinal twin lamellae 222

peridotite, layered sills 231

peridotitic komatiite 36

perovskite 4

phengite 240

phenocrysts, Archaean andesites 310f.

-, basalts 202, 297

-, Caroline Islds. lavas 3f.

-, Colima volcanics 268f.

-, Cretaceous basalts 50

-, hawaiites 347

-, Medicine Lake lavas 148f.

-, Vulsinian lavas 368f.

phlogopite 6, 104, 271, 348

phonolite 368

plagioclase 3f., 15, 36, 41f., 140f., 148, 191, 201, 210, 230, 246, 270, 285f., 288, 297, 310, 347, 360, 368, 382f.

plateau-ages disparity, Briançonnais 389

plattengrass 15

P₂O₅, Colima volcanics 267

polymerization, pyroxene alteration 117f.

prehnite 50

pumpellyite 50, 240f., 310

-, stability 240f.

pyroclastic deposits, Colima 262f.

pyroxene, composition in metamorphic suite 242f.

-, solid solution 88f.

-, ultramafic nodules 298f.

-, -, composition 302

pyroxenite 230f.

Quartz 15, 36, 41, 50, 191, 234, 240, 247, 287, 310, 368, 380

-, microcrystalline 324f.

quartz diorite 41, 234

quartz dissolution experiments 76f.

quartzine 325

quartz/magnetite, O isotope relations in meta-

morphic rocks 241

quartz tholeiite 201f.

Radiotracer, diffusion in melts 254f.

rare earth elements, Adamello granitoids 43

-, Archaean volcanics 314

-, granitic suites 196

-, komatiites 30

-, Scourian granites 382

-, Vulsinian lavas 372

Rb-Sr geochronology, metamorphic rocks,

Cyclades 247

refractive indices, agates 328

regular chlorite/talc mixed layer 103ff.

rhönite, ocean island lavas 5

rhyolite 147, 217, 312

rutile 17

Sanidine 368

saussurite 37

schorlomite 183f.

scoria-fall sequence, Colima 263f.

sericite 310

serpentine 37

serpentinite 184

serpentinization 231

shear stress, critical, limestone 132f.

shoshonite basalts 368

siderite 63

silicate liquids, high-temperature enthalpy and heat capacity 276f.

silicate melts, alkali diffusion 254f.

silica varieties, agates 325f.

sillimanite 15f., 60, 286

sills, layered mafic 229ff.

SiO₂, Colima volcanics 267

site-disorder, diopside 88f.

Sm/Nd age determination, Archaean lavas 28

solid solution, clinopyroxenes 88f.

solution model, clinopyroxenes 90f.

solution parameter, clinopyroxenes 92f.

spessartine 241

sphene 5, 36, 50, 240

spilite 49f.

spilitization, Cretaceous Chilean basalts 49f.

spinel 266, 271, 300, 360

spinel ilherzolite 302

spinifex textures 25

Sr, Colima volcanics 267

Sr isotopic systematics, Medicine Lake

volcanics 176

staurolite 60, 289

stilpnomelane 240

subsolvus reactions, ulvöspinel 360

subsolvus reequilibration, granite petro-

genesis 384

substitutions, quartz 331

-, Si in magnetites 338

supratelluric theory, native iron in basalts

363

system, NaAlSi₃O₈-CaAl₂Si₂O₆ 276f.

Talc, Na-Al-bearing 104f.

-, pyroxene polymerization 125f.

Taylor model, preferred orientation in

limestones 135f.

ternary feldspars 380

thermocouples, calibration 276f.

tholeiites 31f., 203, 210

Ti, garnets 183ff.

titanomagnetite 3f., 268, 297

-, exsolutions and intergrowths 334f.

-, ulvöspinel exsolution 358

tonalite 41f.

topotaxy, pyroxenes/amphiboles 117

topotaxy index, biopyroxenes 128

trace elements, Adamello granitoids 42f.

-, Archaean volcanic suite 313f.

-, Caroline Isld. lavas 8f.

-, Colima volcanics 267

-, granitoids, effect of contamination 41f.

-, hawaiites 351f.

-, -, cause of enrichment 353

-, ilmenites 362

-, Medicine Lake volcanics 174f.

-, Scourian granites 381

-, ulvöspinel 362

-, Vulsinian lavas 369

tracer diffusion, melts 254f.

tracer diffusion coefficients, alkalis in melts 256f.

trachyandesite 217

trachybasalt 217

trachyte 3f., 217, 368

transition metals, diffusion in silicate melts 259f.

tremolite 36
triple chain silicates 117
troilite 359
tuffs 368
twinning, microcline 220f.

Ulvöspinel-native iron assemblage, basalts 358f.
undersaturation, Vulsinian lavas 368f.
upper mantle, komatiite origin 25ff.
-, nature 297f., 304

V, Colima volcanics 267
vitrophyre, magnetite-ilmenite intergrowths 334f.
volcanic clasts 309
volcanism, Caroline Islds. 1f.
-, Colima 262ff.
volcano-sedimentary sequence, Archaean 307f.

Water, agates 324ff.

websterite 304
wehrlite, mineral chemistry 301

Xenocrysts, basalts 298
-, native-iron-bearing in basalts 358

Zircon 17, 247
zoisite 60
zoning, gneiss minerals 19

List of Locations

Adamello Massif, Italy 41
Akatani Deposit, Japan 117
Atenique, Colima 263

Bawarizawa Deposits, Japan 118
Borgarfjörður, Island 326
Briançonnais, Alpes 387, 392
Bühl, Hesse, Germany 360
Bustamente Hill area, Chile 50

Caroline Islds., Pacific 2
Caroline Ridge, Pacific 2
Cascades, Washington 240
Colima, Mexico 263
Crater Flat, Nevada 334
Cyclades, Greece 245

Deccan, India 202
Deer Lake Complex, Minnesota 231
Derrag, Algeria 103
Disco Isld., Greenland 358
Dogi, Oki Islds., Japan 202
Dublon, Truk Islds. 2

Emperor Seamounts, Pacific 2

Fefan, Truk Islds. 2

Gabo suite, S.E. Australia 190
Gardiner River, Yellowstone Park 202
Gee Point, Cascades 241
Giants Causeway, N. Ireland 202
Gilbert Islds., Pacific 2
Giudicarie Line, Adamello 41

Hall Islds., Pacific 2
Hawaiian Islds., Pacific 2
Hoogenoeg, South Africa 36

Iberian Massif, Spain 15
Insubric Line, Adamello 41
Ios, Cyclades 246

Kanto Mts., Honshu, Japan 184
Kerguelen Islds. 202
Keweenaw, Ontario 202
Kilauea, Hawaii 202
Komati, S. Africa 36
Kusaie, Caroline Islds. 2

Latera Caldera, Central Italy 367
Laxford Bridge, Scotland 380
Leonora, W. Australia 308
Leptontine, Alpes 387
Line Islds., Pacific 2
Lochinver, Scotland 380

Mariana Islds., Pacific 2
Marshall Islds., Pacific 2
Mauna Loa, Hawaii 202
Medicine Lake Highld., California 147
Moen, Truk Islds. 2
Monega suite, S.E. Australia 190
Mortlock Islds. Caroline Islds. 2
Mt. Shuksan, Cascades 241
Mumbulla suite, S.E. Australia 190

Naxos, Cyclades 245
Newberry, Oregon 202

Oroluk Atoll, Caroline Islds. 2
Ovifak, Greenland 358

Phoenix Islds., Pacific 2
Pingelap Atoll, Caroline Islds. 2
Ponape, Caroline Islds. 2

Rio Grande do Sul, Brasilia 326

Saar, Germany 202
Sandspruit, S. Africa 36
San Pedro volcano, Chile 255
San Venanzo, Roman Prov., Italy 367
Sardinia, Italy 286
Scourie, Scotland 380
Shibukawa area, Honshu, Japan 184
Shirataki-oboke distr., Japan 184
Skagit Valley, Cascades 241
South Britain, Connecticut 202
Summit Lake, Brit. Columbia 298

Takomkane Mts., Brit. Columbia 298
Tell Atlas, Algeria 103
Tenerife 255
Theespruit, S. Africa 36
Tholey, Germany 203
Truk Islds., Caroline Islds. 2

Udot, Truk Islds. 2
Ulalu, Truk Islds. 2
Usu, Japan 202

Vaagö, Färöer 326
Volcan Colima, Mexico 263
Vulsinian Distr., Central Italy 367

Wangrah, S.E. Australia 190
Waterville, Maine 60
Welcome Well Complex, W. Australia 308
West Kettle River, Brit. Columbia 298
White Chuck Mtn., Cascades 241

Yerington, Nevada 334

